IN THE CLAIMS

The following are Claims 1-24.

1. (Currently Amended) A measurement device comprising:

an acousto-optic modulator adapted to receive a laser beam and modulate the laser beam based upon two ~~one~~ or more frequencies of a received input signal to generate two ~~one~~ or more modulated laser beams, wherein the input signal comprises at least a first signal having a first frequency and a second signal having a second frequency ~~is comprised of one or more signals corresponding to one or more of the frequencies~~;

a multiple-pitch grating adapted to receive two ~~one~~ or more of the modulated laser beams and provide an output laser beam;

a photodetector adapted to receive the output laser beam and provide an output signal;

at least one filter adapted to filter the output signal at two ~~one~~ or more of the frequencies of the input signal and provide a corresponding filtered output signal, wherein the at least one filter comprises at least a first bandpass filter centered at the first frequency to filter the output signal and provide a first filtered output signal and a second

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bandpass filter centered at the second frequency to filter the output signal and provide a second filtered output signal; and

at least one phase detector adapted to determine a phase difference between a phase of the filtered output signal and a phase of a corresponding one of the signals of the input signal, wherein the at least one phase detector comprises at least a first phase detector adapted to provide a first phase difference between the first filtered output signal and the first signal and a second phase detector adapted to provide a second phase difference between the second filtered output signal and the second signal and wherein the phase difference corresponds to a position measurement of the multiple-pitch grating with the first phase difference and the second phase difference providing relative position measurements of the multiple-pitch grating, and a difference between the first and second phase differences provides an absolute position measurement.

2. (Currently Amended) The measurement device of Claim 1, further comprising a lens adapted to direct the two ~~one~~ or more modulated laser beams from the acousto-optic modulator to the multiple-pitch grating.

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3. (Original) The measurement device of Claim 2, wherein the lens recombines a zero order diffraction laser beam and at least one first order diffraction laser beam from the acousto-optic modulator onto the multiple-pitch grating.

4. (Original) The measurement device of Claim 1, further comprising a laser adapted to provide the laser beam to the acousto-optic modulator.

5. (Canceled)

6. (Canceled)

7. (Currently Amended) The measurement device of Claim 1 [[~~5~~]], further comprising:

a first signal source adapted to provide the first signal;

a second signal source adapted to provide the second signal; and

a summer adapted to sum the first and second signal sources and provide the input signal.

8. (Original) The measurement device of Claim 1, wherein the multiple-pitch grating comprises a sinusoidally-modulated amplitude grating having two or more simultaneous spatial frequencies.

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9. (Original) The measurement device of Claim 1, wherein the multiple-pitch grating comprises two or more separate gratings on one substrate.

10. (Canceled)

11. (Canceled)

12. (Canceled)

13. (Canceled)

14. (Currently Amended) A method of obtaining position information of a grating, the method comprising:

receiving a laser beam;

directing the laser beam to provide two or more spatial frequencies corresponding to at least a first frequency and a second frequency;

passing the laser beams with the spatial frequencies through the grating having multiple-pitches to provide one or more output laser beams with encoded position information;

converting the output laser beams to an electrical signal;

filtering the electrical signal to provide at least a first filtered output signal corresponding to the first

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frequency and a second filtered output signal corresponding to the second frequency; and

~~decoding the one or more output laser beams to determine a position of the grating~~

determining a first phase difference between the first filtered output signal and the first frequency and a second phase difference between the second filtered output signal and the second frequency, wherein the first phase difference and the second phase difference provide relative position measurements of the grating, and a difference between the first and second phase differences providing an absolute position measurement.

15. (Original) The method of Claim 14, wherein the grating comprises a sinusoidally-modulated amplitude grating having two or more spatial frequencies.

16. (Currently Amended) The method of Claim 14, wherein the ~~position of the grating is an absolute position measurement~~ directing comprises:

passing the laser beam through an acousto-optic modulator; and

focusing the two or more spatial frequencies towards the grating.

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17. (Original) The method of Claim 14, wherein the grating is formed as part of or attached to an object whose position information is desired.

18. (Currently Amended) The method of Claim 14, wherein the directing comprises: ~~decoding comprises converting the one or more output laser beams to an electrical signal whose phase information corresponds to the position of the grating~~

providing a signal source comprising at least the first and second frequencies;

modulating the laser beam with the signal source to provide the two or more spatial frequencies; and

focusing the laser beams with the two or more spatial frequencies towards the grating.

19. (Original) The method of Claim 14, wherein the two or more spatial frequencies of the laser beam also has corresponding temporal frequencies.

20. (Currently Amended) A system comprising:

a grating having two or more pitches;

means for providing to the grating one or more laser beams with spatial frequencies corresponding to one or more of the pitches of the grating; ~~and~~

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means for transforming ~~decoding~~ an output laser beam resulting from the one or more laser beams passing through the grating to provide two ~~one~~ or more filtered electrical output signals; and

means for determining phase differences between the filtered electrical output signals and temporal frequencies of corresponding ones of the spatial frequencies, wherein a difference in the phase differences ~~the one or more output signals~~ provides an absolute position measurement ~~information~~ of the grating.

21. (Original) The system of Claim 20, wherein the means for providing comprises an acousto-optic modulator adapted to receive a laser beam and an input signal with one or more distinct frequencies to generate the spatial frequencies and associated temporal frequencies of the laser beams.

22. (Original) The system of Claim 20, wherein the means for providing comprises two or more modulators which provide distinguishable laser beams.

23. (Original) The system of Claim 20, wherein the grating comprises a sinusoidally-modulated amplitude grating having two or more simultaneous spatial frequencies.

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24. (Currently Amended) The system of Claim 20, wherein the means for transforming ~~decoding~~ comprises:

a photodetector adapted to convert the output laser beam to an electrical output signal;

at least one filter to filter the output signal; and

at least one phase detector to determine the position information of the grating based upon a phase relationship of the output signal.

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